DECISION MAKING IN A MINIATURE MARKET

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Although behavior analysts have studied the effects of motivation on preference assessments, consumer behaviorist have not. The purpose of this study was to analyze the effect of the temporary removal of a choice on the order and frequency of purchases after the candy returned. Seventy percent of the time the participant purchased the removed candy first and 60% of the time the participant purchased more than in the baseline.

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INTRODUCTION

Behavior analysts have worked in marketing and consumer behavior since John B. Watson's early work in the area. Watson was employed by a large advertising company in the United States, J. Walter Thompson (Ogilvy, 1983). Watson worked his way to become the Vice President of J. Walter Thompson, although there are uncertainties regarding Watson's accomplishments[1] (Bartholomew, 2013). Nonetheless, behavior analysts have continued Watson's early work in marketing, developing theories regarding the effects of behavioral processes in marketing and applying behavioral principles to study the effects of behavioral processes. Foxall (2003) describes this subsection of behavior analysis as consumer behavior analysis.

Emerging from consumer behavior analysis, the Behavior Perspective Model has inspired a behavior-analytic approach particularly to understanding consumers' brand preference (Foxall, Oliveria-Castro, James, & Schrezenmaier, 2011). In this model, marketing is assumed to be a mixture of a hedonic and informational consequences. Hedonic examples may include the vitamin count in an item or what the overall good of the product is to the consumer. Informational consequences resemble feedback systems such as informing consumer of total number of consumers who use this product, how good the product is for the environment, or a celebrity endorsement. It is not clear that these distinctions are important due to the fact that most marketing strategies contain a mixture of both making it hard to judge which characteristic is most evokes a purchase. Foxall et al. (2011) propose that when each brand is functionally similar, many consumers purchase different brands, seemingly at random. A marketer's goal is to analyze the individual events that result in either benefits or aversive stimuli for the consumer as

[1] Watson's impact on the field of marketing is debatable; as he may not have invented some tactics to marketing such as before and after images and using emotion to engage a potential consumer (Bartholomew, 2013).

a function of their choice. If, for example, Brand X is purchased more than Brand Y, it is said Brand X has either more benefits, less cost, or a combination of both when compared to Brand Y. This view may be over simplified as there can be many additional factors that control the consequences of choosing one brand over an alternative such as cost (Shampanier & Ariely, 2007), availability (Shin & Ariely, 2004), and advertising (Caples, 1974).

Another technique to alter people's preference is choice architecture (Thaler & Sunnstein, 2008). Choice architecture studies the influence of antecedent interventions on the shift of behavior either away or towards an outcome. The fundamental point of choice architecture is not to force individuals to buy but to arrange the environment so that the desired response occurs without prompting or forced choice. For example, officials moved the lines on a curvy road closer together to prevent further accidents; drivers, when they see the lines moving closer and closer together, the drivers slowed down as it appeared their car was accelerating (Thaler & Sunnstein, 2008). Other examples of choice architecture attempt to influence culture. During WWII, the meat industry sent most beef and pork to the soldiers overseas leaving a dwindling supply in the United States (Romm, 2014). To counter this the government pushed sales of organ meat. To do this they labeled the organ meat the food of "patriots" and pushed community members to take cooking classes to increase the use of organ meat. This intervention's long-term effects can still be seen in American's eating habits despite the removal of the demand of meat overseas.

Foxall et al. (2011) suggest that consumers' brand preference is demonstrated when a consumer purchases one type of product more frequently than similar alternative products. They go on to explain that a better understanding of brand preference can lead to an increase in sales, the development of new products, and a change in what purchases are made by a consumer.

When a consumer shows preference for a certain product, it results in an increased number of purchases when compared to any alternative. The emphasis of marketing is to shift the preference of consumers. Behaviorally speaking, the purpose of marketing is not only to shift preference but also to increase the frequency of purchases, which results in an overall increase in purchases of a product and an overall decrease in purchases of an alternative item or service. Brand preference is possibly the most important area for researchers to study in consumer behavior analysis (Foxall, Oliveria-Castro, James, & Schrezenmaier, 2011). Consider that in 2007, the average consumer was exposed to an estimated 5,000 advertisements a day (Story, 2007). Each advertisement is an example of marketing and is intended to evoke a purchase.

One challenge related to studying consumer brand preference is how to measure it. However, the measurement of preference is a topic that has been studied extensively by behavior analysts working in other areas. In the applied behavior analytic literature, preference is most commonly assessed through preference assessments (Deleon & Iwata, 1996; Fisher et al, 1992; Pace et al. 1985; Windsor, Piche, & Locke, 1994). These assessments can be useful for identifying reinforcers that can be used to shape behavior. Behavior analysts have developed at least four types of stimulus preference assessments that may be helpful to those interested in gaining a better understanding of consumers' brand preference.

Pace et al. (1985) developed the first of such stimulus preference assessments. They explored a stimulus preference assessment with six individuals with disabilities. Sixteen items were presented one at a time and if the participant approached the item within 5 s, the participant would have access to the item for 5 s. If the stimulus did not evoke an approach within the 5 s, then the item was removed. Items that were approached for 80% or more of the trials were

considered preferred. Pace et al. concluded that their methodology was easy to implement for staff, saved time, and most importantly, identified reinforcers.

Fisher et al. (1992) developed the paired-stimulus preference assessment. Experimenters presented a total of 16 stimuli to three children with disabilities. Two stimuli were presented concurrently to each child until each stimulus was presented as a choice contrasted with each of the other stimuli from the set of 16. Preference was calculated as the items that were selected the highest percentage of opportunities, resulting in a hierarchy of preference in which the items selected most frequently were considered more preferred than the items selected less frequently. More importantly, Fisher et al.'s paired-stimulus preference assessment methodology resulted in fewer false positives than Pace et al.'s (1985) methodology. To summarize the paired-stimulus preference assessment lead to a hierarchy of potential reinforcers. This is important because more items could be assessed as reinforcers.

Expanding on Fisher et al. (1992), Windsor et al. (1994) proposed a second type of preference assessment: the multiple stimulus preference assessment. Windsor et al. gave eight adults with disabilities six different foods from which to choose. Each participant selected from these six options a total of ten times. The items selected the most out of the 60 presentations were considered to be more preferred than the items selected fewer times. Windsor et al. noted that the multiple stimulus preference assessment took approximately half of the amount of time as the paired-stimulus preference assessment because more than two stimuli were presented concurrently. However, this resulted in fewer stimuli that could be tested for preference in each assessment.

DeLeon and Iwata (1996) developed a third type of preference assessment: the multiple stimulus without replacement (MSWO). DeLeon and Iwata noted that with the multiple stimulus

without removal, a participant might choose the same item during each trial which would allow for an assessment of preference for only one item rather than a hierarchy of preference across items. DeLeon and Iwata's MSWO begins the same way as the multiple stimuli assessment; however, each time an item is selected the experimenter removes the selected item from the array. DeLeon and Iwata conducted the MSWO with seven adults with disabilities. Each participant was presented with an array of eight items and once the first item was selected from the array the experimenter did not replace it, which left only seven items remaining in the array. The first item selected was assumed to be more preferred than the next selected item. This procedure continued until no items were left or no items were selected in a 30 s window. The same procedure was repeated with the same stimuli for four additional sessions (a total of five sessions). Their results showed that the MSWO did help to identify a hierarchy of preference where the multiple stimulus assessment without removal did not.

Carr, Nicolson, and Higbee (2000) modified the MSWO to make it more efficient. In their extension of DeLeon and Iwata (1996), Carr et al. conducted only three sessions rather than the original five sessions. Carr et al. found that their procedures reliably predicted preference for three participants with disabilities; however, a stable preference was only seen in two of their three participants.

Like the MSWO, response-restriction (RR) assessments have been developing using continuous interval tracking to measure a participant's preference in a free-operant approach (Hanley et al., 2003a). Hanley et. al presented an array of seven activities to 3 adults with disabilities. The researchers decided which item of an array was to be restricted by the following rules:

> Several rules were developed for determining activity preference and restricting an activity in subsequent sessions. The simplest was that preference for (and subsequent

> restriction of) an activity was determined if 60% or more intervals of interaction were observed with that activity across two consecutive sessions (Rule 1). Additional sessions beyond two were conducted with the same number of activities if this rule was not met. If interaction with the same activity was observed in 60% or more intervals in two of three sessions and responding was not allocated to an alternative activity for 60% or more intervals in those same sessions, then that activity was restricted (Rule 2). If responding was variable (i.e., different activities were associated with the highest levels of interaction across sessions), sessions continued until (a) responding was consistently and evenly distributed among a small group of activities (two or more); then that entire group of activities was restricted (Rule 3) or (b) responding was more consistently allocated to one of the remaining activities (Rule 4). Removal of the next most highly preferred activity (or activities) continued across sessions until either high levels of interaction were observed with each of the seven activities or until little or no interaction (less than 20% of intervals) occurred with the remaining activities for at least two consecutive sessions (Rule 5; this never occurred with these 3 participants). Once an assessment was completed (either interaction was observed with all activities or little or no responding towards the remaining activities was observed), it was repeated to assess the consistency of preferences. (p. 50)

By following these rules, a researcher could develop a hierarchy of preference.

Preference assessments are widely adopted in applied behavioral analytic research and practice as tools for identifying potential reinforcers for individuals with disabilities (Tullis et al., 2011). The number of stimuli presented concurrently has increased from one in an approach-based measure to a range of stimuli in multiple stimulus with and without replacement preference assessments. The multiple stimulus with replacement assessments also decreased the duration of the assessment. However, the multiple stimulus assessments lead to fewer identified potential reinforcers than the MSWO preference assessments (DeLeon & Iwata, 1996).

More recently, some researchers have started to use stimulus preference assessments in applied settings outside of developmental disabilities (Wine, Reis, & Hantula, 2014). For example, Wine et al. (2014) compared the MSWO, a ranking, and a survey with direct care staff. Their results showed that the survey identified more potential reinforcers than the ranking and the MSWO, and that the ranking identified more potential reinforcers than the MSWO. Direct care staff also rated the MSWO as the least preferred, the most complex, and the least likely to

be used if required to measure preference. Given the low social validity with respect to the MSWO, Wine et al. suggested that it is not viable in all applied settings.

Even though few researchers have looked at the use of preference assessments with typically developing individuals (McAdam et al. 2005; Wine et al., 2014) or for reasons other than selecting potential reinforcers for training sessions and research, the multiple stimulus assessments (Carr et al., 2000; DeLeon & Iwata, 1996; Windsor et al., 1994) closely parallel real-world purchasing of items or services and may offer a way to start to quantify consumers' brand preference. The methods employed in stimulus preference assessments are similar to the natural environment in which a consumer makes purchases from an array of alternatives. When purchasing online, in a physical store, or from a vending machine, we are exposed to multiple stimuli concurrently, similar to multiple stimulus preference assessments. Nonetheless, consumer behavior analysts have not explored the use of stimulus preference assessments in their studies of brand preference. They have not tested the efficacy of these measures with respect to studying brand preference nor have they explored the variables that may alter the probability of choosing one product or another.

Two studies found that preference assessment results could be altered as a function of the availability of a potential reinforcer prior to the assessment. Gottschalk, Libby, and Graff (2000) conducted an experiment with four individuals with developmental disabilities and examined the effects of both satiation and deprivation with edible items. Satiation was defined as free access to the edible item for 10 min before the assessment. Deprivation was defined as removing access for 48 hr. In the control condition, all items were withheld for 24 hr. They found that both deprivation and satiation can influence the results of a preference assessment.

To follow up Gottschalk et al. (2000), McAdam et. al (2005) conducted a similar study with three typically developing children and three teenagers with behavioral problems. The main difference in this study was the use of tangible items instead of edibles. The satiation condition included free access to the tested item for 10 to 20 min while the alternatives were unavailable for 24 to 144 hr. The deprivation condition consisted of 10 min of access to all alternative items while the tested item was unavailable for a range of 24 to 144 hr. McAdam et. al. concluded that the deprivation of an item would increase the probability that it was selected in the future. Their results again concluded that both deprivation and satiation can influence the results of a preference assessment.

RR methods have also been used to increase the amount of engagement in a less preferred activity (Hanely et al., 2003b). Hanely et al. first assessed preference using the RR with seven individuals with disabilities. After preference was stable, activities that were more preferred were made contingent on engaging with a less preferred activity. This resulted in an increase number of intervals engaged with the less preferred activity. Hanley et al. repeated these results in an additional study by giving candies to the participant contingent on engaging with a less preferred activities. They concluded that participants' preference assessment results could be changed using more preferred activities as reinforcement for less preferred activities. \

A real-world example of the removal of a choice and how it alters consumer behavior can be seen in the McRib (Berger, pg. 56-57, 2013). McDonald's, in 1978, introduced the McNugget. This product was immediately a huge hit with customers; however, McDonald's did not have means to keep up with the demand. This was due to the lack of chicken. To counter this, they introduced the McRib: a boneless rib composed of mostly unwanted pig meat. This meat was hidden in a thick layer of barbecue sauce which functioned as the paste for the pickles, onions,

and the two buns. Although the McRib tested well on recruited testers, the sales of the sandwich were not high. McDonald's tried promotions and advertising campaigns but to no avail and the McRib was discontinued. After ten years McDonald’s tried to bring back the McRib but limit the availability. This time the McRib was offered only at limited times in select cities. This created a cult following which included websites to track the McRib's sales location, a Facebook fan page, and an overall increase in sales of the McRib.

The purpose of the current study was to use preference assessment procedures to further our understanding of consumer behavior in a miniature market. Specifically, the experimenter was interested in determining if the brief removal of an option would alter the frequency of purchases and/or the order in which items were purchased when this option was returned to the array.

METHODS

Participants

Participants were recruited from undergraduate courses in behavior analysis at a large state university with an online classroom announcement. The announcement briefly described the study and indicated that participants would play a game to earn either Skittles candies or Gummy Bears and that they would be paid $5 at the conclusion of every session. Six undergraduate students, four females and two males, between the ages of 18 and 25 participated. Two participants were freshman, one was a sophomore, one was a junior, and one senior.

Materials and Setting

The experiment was conducted in a research room on a 2.84 x 1.42 m tabletop. Participants sat at the table across from the experimenter. The experimenter arranged a 5x3 matrix of 3x5” colored note cards and four clear containers. The number "30" was hand-written with black ink on each card in the first row of the matrix. In the second row, cards were labeled with an arbitrary brand name: "A", "B", "C", and "D". The containers held 113.3981 g and were half full of Skittles candies of various colors. The purple Skittles corresponded with "A", green Skittles with "B", red Skittles with "C", and orange Skittles with "D" (see Figure 1).

A number keypad attached to a Surface Pro 3 served as the manipulandum. The computer was opened to a game created with Gamemaker™ that had three operations: a countdown timer that ran for 15 s, a scoreboard that increased by .20 each time the “0” key was released, and a “Start” button that would restart both the countdown timer and the score board when touched. The text “Press Zero” was also displayed on the screen. A camera was placed on the far right of the table near tokens of three different colors (white, blue, green) and the experimenter also had

red tokens. The experimenter used a pen and paper to record the purchases the subject made during the experiment.

Measurement

Participants used a seven-point Likert-scale (see Appendix C) to assess the ratings of cut, color, texture, taste, and desire to try the Skittles candies again. Cut referred to the physical appearance of the Skittles candies, as some Skittles candies were ill formed, oddly shaped, or did not look typically evenly shaped. Color referred to how much the participant enjoyed the color. Texture referred to how much the participant enjoyed the texture. Taste referred to how much the user enjoyed the taste. Desire to try again referred to how much the participant wanted to purchase the flavor again.

The experimenter also recorded the cumulative number of purchases for each of the four different Skittles candies (red, orange, green, purple). This was the dependent variable during the consumer phase. A purchase was recorded when the participant asked for, reached for, or was handed a specific Skittles candy in exchange for 30 tokens. A purchase did not require that the participant consume the Skittles candies in all conditions.

After the experiment concluded, the participant rank ordered their preference and answered the following questions: (a) What made them participate in the study? (b) What occurred in the study? and (c) How did that occurrence make them feel?

Procedures

Initial Set-Up

The room was set up and ready to begin when the participant arrived. Each participant

started the session by sitting across from the experimenter. After the participant signed the informed consent form, they were told how the game would operate. The experimenter pointed to the screen and gave the following explanation:

> This is a countdown timer, and this is a point-counter. I will press start when you tell me that you are ready. These points are exchanged for tokens at the end of the timer. The timer runs for 15 seconds. During this time you will earn points by pressing the number "0". After these 15 seconds you will receive the tokens.
>
> There are three tokens. The white is worth 1 point, the blue is worth 5 points, and green is worth 30. Each Skittle has a price displayed next to it.
>
> The first thing we will do is have you sample all four flavors. As indicated by the price card, you must earn thirty tokens before purchasing a Skittle. After you give me 30 tokens, I will ask you to visually inspect the Skittles and rank it on this form before I let you eat the Skittles. Finally, you will rank how the Skittles tasted. This will be done four times, once for each flavor.
>
> After this point you will be allowed to purchase any Skittles you please for the remaining time of the experiment. Do you have any questions?

The Game

After the rules were explained and questions were answered, the experimenter pressed the "START" button and started a 15-s timer. The participant could then start accumulating points. When the participant hit the "0" button on the keyboard, a number would appear on the screen. Each press of the "0" button earned .2 of a token such that it took five presses to earn one token. Each time a participant earned five tokens, a small "beep" sound would come from the computer signaling to the experimenter that five tokens had been earned. A countdown timer displayed how much time was left before the end of the 15-s interval.

The participant responded for the entire 15-s interval. Once the timer reached zero and showed "000" on the screen, the participant could not earn additional tokens. The experimenter

looked at the screen and handed the appropriate number of tokens to the participant. The experimenter then asked the participant if they were ready to play again.

Sample Phase

In the sample phase, participants were required to earn tokens, purchase each type of Skittles candies, and rate each type of Skittles candies until they had sampled all four Skittles candies' colors. Once the participant earned at least 30 tokens, the experimenter would prompt them to buy. In between working intervals, the experimenter would say, "I think you have 30. Which one would you like to sample first?" Then, the participant could choose whichever color of Skittles candy they wanted after collecting 30 tokens and handing them to the experimenter. The purchase was completed when the experimenter handed the participant the Skittles candy.

After a purchase, the participant inspected the Skittles candy and was given a brief survey. The participant would circle a number from 1-7 on the Likert-type scale in which 7 indicated high quality and 1 indicated low quality. Participants evaluated the Skittles candies on the aspects of color and cut. The participant's visual inspection of the Skittles candy occurred during the first half of the survey. The second half of the survey involved eating and tasting the Skittles. This was to determine if the cut or color of the specific Skittles candies altered the participant's report. If the cut score was lower than the ratings for the previously rated candies, the participant was asked to return this Skittles candy for a replacement candy before eating the Skittles candy.

Once the first half of the survey was completed, the experimenter told the participant to eat the Skittles candy. The participant rated the texture, taste, and desire to try the Skittles candy

again on the same 7-point scale. After the participant consumed the Skittles candy, the experimenter asked if they were ready to keep going to acquire the remaining three samples.

Once all four Skittles candies had been purchased, rated, and consumed, the participant was reminded that they could then buy any Skittles candy they pleased. This marked the conclusion of the sampling phase and the beginning of the baseline consumer phase.

Consumer Phase: Baseline

Participants continued to work for 15-s intervals and had to earn at least 30 tokens prior to purchasing Skittles candies. The primary differences between the Baseline Consumer Phase and the Sample Phase were that in the Baseline Consumer Phase, participants were not forced to buy after collecting 30 tokens and the participants were not instructed as to how to save their tokens. Participants could buy as many Skittles candies as they wanted and they could buy them as frequently as they preferred. Also, the experimenter did not require that the participants eat the Skittles candies that they purchased. The experimenter recorded what the participant purchased after each purchase.The Baseline Consumer Phase ended after the participant purchased at least eight Skittles candies; however, participants were not told the termination criterion.

Consumer Phase: Removal of Least Preferred

After at least eight purchases in the Baseline Consumer phase, the experimenter removed the Skittles' container that was picked the least and removed the 3x5” notecards. For example, if a participant picked three reds, three greens, two oranges, but no purples the orange container was removed along with the corresponding 3x5” notecards. If two of the colors tied as the least purchased Skittles candy color, one of the two was still removed, but there was no special

selection process for this. When a container was removed, the experimenter placed it out of the participant's sight. The participant continued to earn tokens and could purchase from any of the three remaining Skittles candy's containers. This process continued for three additional purchases.

Consumer Phase: Return to Baseline

After the third purchase, the removed choice was put back in the previously occupied space. This phase was identical to the first baseline condition and the number of purchases that occurred in the first baseline terminated the second baseline Sessions typically lasted between 25 and 40 min.

Closing Survey

After the sample phase and the consumer phases concluded, participants filled out a form of open-ended questions (see Appendix C). Participants were asked to rank order the Skittles candies from most to least favorite. They were also asked what made them participate in the study, what occurred in the study, and how those occurrences made them feel.

Participants were told that they would be contacted to return for a follow-up session.

Experimental Design

The experiment was conducted using a sampling phase that was followed by an ABA design in which A was the baseline consumer phase and B was the removal of least preferred consumer phase.

Interobserver Agreement

An independent research assistant collected interobserver agreement (IOA) of purchasing behavior for 100% of sessions for all six participants. The research assistant was first trained on what a purchase was and told how many purchases were made in each video. The research assistant then watched the video with headphones and recorded the order and color of each purchase made by the participant. IOA was 100% for all sessions for all participants.

RESULTS

The data for each participant are depicted in Tables 1-6 and Figures 2-7. Participant 1's data for the first session are shown in Table 1 and Figure 2. Participant 1 rated the green Skittles candies highest in taste (7), followed by the orange Skittles candies (6), the red Skittles candies (5), and the purple Skittles candies (4). During baseline, Participant 1 selected green Skittles candies the most (6 times) and she selected orange and red Skittles candies only once. The container of orange Skittles candies was removed. When the orange Skittles container was reintroduced, the participant selected the orange Skittles candy first and only one additional time across the final eight purchases. Participant 1 reported feeling hungry, and she explained that during the experiment she "was given the amount of token[s] earned during the experiment. Nothing change[d], everything stayed the same." At the end of the experiment Participant 1 reported she enjoyed the green Skittles candies the best followed by the red, orange, and purple Skittles candies.

Participant 2's data for the first session are shown in Table 2 and Figure 3. Participant 2 rated the green and red Skittles candies highest with respect to taste (7), followed by orange (5) and purple (5). During baseline, Participant 2 purchased green Skittles candies the most (4 times) followed by the red Skittles candies (3 times). She selected the orange Skittles candy once and did not purchase purple Skittles candy. The container of orange Skittles candy was removed. When the orange Skittles candy container was reintroduced, the participant selected the orange Skittles candy first and only one additional time across the final eight purchases. Participant 2 reported that during the experiment he "had to pick one of each in the beginning but had open choices for a while, orange was taken away and brought back." He reported that he was

"confused on why it would be that color." At the end of the experiment, Participant 2 reported he enjoyed green the best followed by red, orange, and purple.

Participant 3's data for the first session are shown in Table 3 and Figure 4. Participant 3 rated the green, red, and orange Skittles candies the highest seven times each and he rated the purple Skittles candies the highest only four times. During baseline, Participant 3 purchased the red twice and the green Skittles six times). The container of red Skittles candies was removed. When the red Skittles container was reintroduced, Participant 3 selected the red Skittles first, and only purchased them a total of two times in the return to baseline (which was the same as in the initial baseline). Participant 3 reported that she "pressed a button then after a while he [the researcher] took the red skittles out but put them back in after a few turns." She reported feeling "good, it was fun playing the game." Participant 3 reported that the green Skittles candies were her favorite, followed by the red, the orange, and finally the purple Skittles candies.

Participant 4's data for the first and second sessions are shown in Table 4 and Figure 5. In the first session, Participant 4 rated the red and green Skittles candies highest in taste (7), followed by the orange (6) and purple (6) Skittles candies. During baseline, Participant 4 selected the green and the orange Skittles candies the most (3 times each); she selected the red Skittles candy once and the purple Skittles candy once. The container of red Skittles candy was removed. When the red Skittles container was reintroduced, Participant 4 purchased the red Skittles candy first and then purchased the red Skittles one additional time as compared to baseline (twice in total). Participant 4 reported that "for a while, the red option was taken away then reintroduced a while later, but I didn't notice for a while that it was back." She felt "confused and thought maybe [she] should consider the options besides orange more in case they were taken away." At

the end of the first session, Participant 4 reported that the red Skittles candies were her favorite followed by the orange, the green, and then the purple Skittles candies.

In the second session, Participant 4 rated the green and the purple Skittles candies the highest in taste (7), followed by the orange (5) and the red (5) Skittles candies. Participant 4 selected the green Skittles candies the most (4 times), followed by the red Skittles candies (2 times) and the orange (1 time) and the purple (1 time) Skittles candies. The container of purple Skittles candies was removed. When the container of purple Skittles was reintroduced, Participant 4 purchased them first and then purchased them again on one additional trial. Participant 4 reported that during the experiment that "The purple was taken away then replaced," and she reported "I regretted not getting more of the purple earlier, even though I still didn't actually want any purple ones." At the end of the second session, Participant 4 rated the Skittles in the following order from greatest to least: green, red, orange, and purple.

Participant 5's data for the first and second sessions are shown in Table 5 and Figure 6. In the first session, Participant 5 rated the green Skittles candies the highest in taste (6), followed by the red (5), orange (4), and purple (3) Skittles candies. Participant 5 saved coins and purchased many Skittles candies simultaneously; therefore, Participant 5 made ten purchases in baseline instead of eight. During baseline, Participant 5 selected the orange Skittles candies the most (6 times) followed by the green (3 times), red (2 times) and purple (one time) Skittles candies. When the purple Skittles candies were purchased, they were purchased in combination with all the other colors, with the participant purchasing one of each Skittles candy color for his final purchase. The purple Skittles candies were removed. When the container of purple Skittles candies was reintroduced, the participant purchased the orange Skittles candy first and never purchased the purple Skittles candies. Participant 5 reported that he "strategized how I saved my

tokens to combine different tastes and longer consumption." This made him feel "accomplished for getting Skittles in a timely manner." At the end of the experiment, Participant 5 rated the orange Skittles candies as his favorite followed by the green, red, and purple Skittles candies.

In the second session, Participant 5 rated the orange Skittles taste the highest (6), followed by the green (5), red (5), and purple (3) Skittles candies. During baseline, Participant 5 selected the orange Skittles candies the most (5 times) followed by the green (3 times) and red (2 times) Skittles candies. The red Skittles container was removed. When the red Skittles container was reintroduced, Participant 5 purchased the red and the green Skittles candies first and then purchased them a total of four times (red) and five times (green). Participant 5 reported "halfway through, the red Skittles were taken away for a couple of turns." He reported that he felt "nothing, I had to pick between my two other favorites." At the end of the experiment Participant 5 reported he enjoyed the orange Skittles candies the best followed by the red, green, and purple Skittles candies.

Participant 6's data for the first, second and third sessions are shown in Table 6 and Figure 7. Participant 6 rated the red Skittles candies highest in taste (7), followed by the orange Skittles candies (6), the green Skittles candies (5), and the purple Skittles candies (5). During baseline, Participant 6 selected the red and orange Skittles candies most (3 times) and the orange Skittles candies were selected three times. She selected the green Skittles candies twice. The green Skittles container was removed. When the container of green Skittles was reintroduced, Participant 6 purchased the red Skittles first and purchased the green Skittles candies the same number of times as in baseline. The participant also vocally reported, "I'm buying purple to mess up your data" after the green Skittles container returned. Participant 6 reported: "I pushed a button for 15 sec to earn tokens then I bought Skittles [sic] with tokens." She reported she "had

fun." At the end of the session, Participant 6 reported she enjoyed the red skittles the best followed by the orange, green, and purple Skittles candies.

In the second session, Participant 6, rated the red and green Skittles candies highest in taste (7), followed by the orange (6) and purple (5) Skittles candies. During baseline, Participant 6 purchased the red and orange Skittles candies the most (3 times each). She purchased the green Skittles candies only twice. The green Skittles container was removed. When the green Skittles container was reintroduced, Participant 6 purchased the green Skittles candy first, and purchased them again on only one additional trial for the final nine trials. The purple Skittles candies were the ninth purchase as the participant had enough to afford an additional Skittles candy purchase. Participant 6 reported that she had to “pressed a button to earn Skittles”, and when asked how she felt about it, she said she had fun. At the end of the experiment Participant 6 rated the red Skittles candies first followed by the orange, green, and purple Skittles candies.

In the third session, Participant 6 rated the red Skittles candies highest in taste (7), followed by the orange Skittles candies (6), the green Skittles candies (6), and the purple Skittles candies (4). During baseline, Participant 6 selected the red Skittles candies the most (5 times) followed by the orange (2 times) and the green (1 time) Skittles candies. The green Skittles container was removed. When the green Skittles container was reintroduced, Participant 6 selected the orange Skittles candies first and purchased the green Skittles candies one additional time as compared to baseline. Participant 6 reported "I pushed a button to earn tokens then bought Skittles with the tokens." She again reported that she "had fun." At the end of the experiment, Participant 6 reported she enjoyed the red, orange, green, and purple Skittles candies.

Table 7 summarizes both effects seen across all participants. Out of the 10 times the least selected Skittles candy was removed, the participant purchased that specific Skittles candy 70% of the time. 70% of the time the removed Skittles was purchased more than baseline.

DISCUSSION

During the experiment, each participant purchased different Skittles candies and reported different preferences. In addition, when the Skittles container was returned to the array, six participants purchased the removed Skittles container first for at least one session, and five out of the six participants purchased more of the removed Skittles candies after they were returned. Each participant, except for Participant 4, also purchased at least one additional Skittles candy than had been purchased in baseline.

The results of this study align with both McAdam et al. (2005) and Gottschalk et al. (2000). By limiting the availability of a choice, that specific item was selected more in the future. The difference between these studies and the present study is the duration of the removal was less, the participants were college students and not children or individuals with disabilities, and the current study required participants to earn tokens and purchase from an array of items.

Both McAdam et al. (2005) and Gottschalk et al. (2000) cite an evocative effect as the reason for the change in preference. Establishing operations have two effects: the reinforcer establishing and the evocative effect (Michael, 1993). The evocative effect is an effect that increases the effectiveness of all discriminative stimuli (S^D) for behavior that have been followed by reinforcement and increases the frequency of behavior that has been followed by those reinforcers and other conditioned reinforcers. The evocative effect may provide a potential explanation of the current study's results. That is, the removal of the Skittles container may have been a motivational operation that increased the value of that Skittles candy.

Related to establishing operations (Klatt & Morris, 2001), Response Deprivation Hypothesis (RDH) may provide an additional explanation of the predictability of the participants' first purchase following the reintroduction of the removed candies. RDH suggests

that by withholding an activity below its baseline, the organism's behavior will increase in frequency when given the opportunity to engage in that behavior again (Timberlake & Allison, 1974). In an applied setting with adults with schizophrenia, RDH has been used to increase socially appropriate behavior and decrease psychotic responses and coughing (Dougher, 1983). In the present study's baseline, each participant purchased at least one of the Skittles candies that was later removed. By withholding access to the purchasing response for that color of Skittles candy, it decreased the opportunity for that color of Skittles candy to be purchased below baseline levels for the next three purchases. It should be noted that in RDH, the removal should have occurred for the same number of purchases as baseline. For example in baseline if the purchase of a Skittle occurred only 12.5% of the time the removal needs to occur for as many purchases as the baseline.These results may be related to the RDH model; however, the removal needed to match the baseline number of purchases.

Therapeutically, someone removing an item from an array maybe a useful tool to establish a wider range of total items selected. Currently in the MSWO procedure, only the items that are selected are removed. If an item is never selected it remains in the array. If the client does not approach any of the items after a certain duration of time the session ends. Instead of removing the item that was previously selected another strategy could be removing the selected item and one other item simultaneously. If the removed unselected items could later function as reinforcers, this procedure maybe be beneficial for reinforcer expansion. This is because the removal of an unselected item may increase the value or probability when the option is available again. A therapist who removes the opportunity to play with a soccer ball may want to make sure a soccer net, an outdoor area, and a team is available when the soccer ball is reintroduce. If the

purchase of a product can be predicted, a marketer can arrange a sale, coupon for next purchase, or some other tactic to increase buying in the future.

This study has several limitations. Each participant was not using their own money but instead tokens. Stated alternatively, the participants could not save their earnings and spend their tokens on anything else besides Skittles. This is especially important to note because this study revolves around preference. For example, Participant 6 who in the first session reported that she purchased more of a certain color to distort the experimenter's data may have behaved differently if there was no payment or some other items were available for purchase. A study that made the participant spend his own money perhaps would give entirely different results.

In this study, participants initially used a Likert scale to report their preference while after the experiment participants ranked their Skittles preference. It would have been better to use the same type of measurement before and after. This would have left a better comparison of what the participant reported about each individual Skittles candy. Any difference in participants' reports could be a factor of how the question was asked and not the result of the independent variable of the removal of the Skittles container. By changing the survey this would allow the experimenter to easily compare the verbal reports of the participants.

With Participant 2, the baseline should have been extended. Orange was removed right after it was selected. Because of the immediacy of the removal after purchase, the removal may have functioned as a negative consequence. A more stable baseline would show and better demonstrate that the behavior after the removal was due to the removal and reintroduction of the Skittles Candy.

Another limitation and possible venture for future research was to add an additional Skittle color and start with a wider array than four. An additional Skittles color would have

demonstrated stronger evidence that the removal of the Skittles candy was in fact the change in what Skittles candy was purchased first. Every additional Skittles candy would have served as a control against the removed Skittles candy. These Skittles would have been a control because with a wider array, the participant would have had a larger selection to choose from decreasing the likelihood that the removed Skittles was purchased due to chance.

An opportunity for future research could involve introducing a novel Skittles candy. If novelty and the reintroduction of a stimulus show similar effects on behavior, a comparison of both the reintroduction and novel introduction could be studied for creating new products in branding. As new products cost much more money to develop, reintroducing something that has been removed may be better as a marketing technique.

As with any free market, Participant 5 purchased more than one Skittles candy simultaneously. This raised additional questions on how to group purchases and how to measure the least and most preferred. Participant 5's last choice in his first session was to select all four colors at the same time. It is unclear if this should be counted as a singular purchase of a red, orange, green, and purple or if it should be counted as 4 separate purchases (1 red, 1 orange, 1 green, and 1 purple). This was the only time Participant 5 purchased the purple Skittles, and the experimenter removed it. Participant 5 did not purchase the purple Skittles on its return, and he did not purchase any during the rest of the experiment. Participant 5 never purchased the purple Skittles alone. The significance of a multi-purchase is unknown and may warrant further study.

Although these results are tentative, assessments used in clinical settings may be useful to marketers, consumer behavior analyst, and sales associates. Specifically, the multiple stimulus preference assessments may be useful for online shopping as dozens of choices are presented

simultaneously to consumers. In conclusion, this study was able to begin to assess some of the variables that control and change patterns of purchasing behavior.

Table 1

Participant 1's Ratings and Purchase Results

		Session 1			
		Red	Orange	Green	Purple
Pre-Experiment Rank	Taste	3	2	1	4
	Try again	3	2	1	4
Baseline Purchases		1	1	6	0
After Removal Purchases		0	2	6	0
Post Experiment Rank		2	3	1	4
Explanation of Occurrence		Was given the amount of token pressed during the experiment. Nothing changed everything stayed the same			
Feelings		Hungry			

Table 2

Participant 2's Ratings and Purchase Results

		Session 1			
		Red	Orange	Green	Purple
Pre-Experiment Rank	Taste	1.5	3.5	1.5	3.5
	Try again	1.5	4	1.5	3
Baseline Purchases		3	1	4	0
After Removal Purchases		2	2	2	2
Post-Experiment Rank		2	3	1	4
Explanation of Occurrence		I had to pick one of each in the beginning but had open choices for awhile, orange was taken away and brought back			
Feelings		Confused on why it would be that color			

Table 3

Participant 3's Ratings and Purchase Results

		Session 1			
		Red	Orange	Green	Purple
Pre-Experiment Rank	Taste	2	2	2	4
	Try again	2	4	2	2
Baseline Purchases		2	0	6	0
After Removal Purchases		2	1	5	0
Post-Experiment Rank		2	3	1	4
Explanation of Occurrence		I pressed a button then after a while he took the red skittles out but put them back in after a few turns.			
Feelings		Good, it was fun playing the game			

Table 4

Participant 4's Ratings and Purchase Results

		Session 1				Session 2			
		Red	Orange	Green	Purple	Red	Orange	Green	Purple
Pre-Experiment Rank	Taste	3.5	1.5	3.5	1.5	1.5	3.5	3.5	1.5
	Try again	1.5	3.5	1.5	3.5	3	3	3	1
Baseline Purchases		1	3	3	1	2	1	4	1
After Removal Purchases		2	3	2	1	2	1	3	2
Post Experiment Rank		1	2	3	4	1	2	3	4
Explanation of occurrence		For a while the red option was taken away, then reintroduced a while later, but I didn't notice for a while that it was back				The purple was taken away then replaced			
Feelings		I was a bit confused, and thought maybe I should consider the options besides orange more in case they were taken too.				I had fun.			

Table 5

Participant 5's Ratings and Purchase Results

		Session 1				Session 2			
		Red	Orange	Green	Purple	Red	Orange	Green	Purple
Pre-Experiment Rank (Favorite to Least)	Taste	1.5	1.5	3	4	2.5	1	2.5	4
	Try again	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Baseline Purchases		2	4	3	1	2	5	3	0
After Removal Purchases		1	8	2	0	4	5	1	0
Post-Experiment Rank (Favorite to Least)		1	2	3	4	1	2	3	4
Explanation of occurrence		Strategized how I saved my tokens to combine different tastes and longer consumption				Halfway through the red skittles were taken away for a couple turns			
Feelings		Accomplished for getting skittles in a timely manner				Nothing I just had to pick between my two other favorites			

Table 6

Participant 6's Ratings and Purchase Results

		Session 1				Session 2				Session 3			
		Red	Orange	Green	Purple	Red	Orange	Green	Purple	Red	Orange	Green	Purple
Pre-Experiment Rank	Taste	1	2	3.5	3.5	1.5	3	1.5	4	1	2.5	2.5	4
	Try Again	1	2	3.5	3.5	1	2.5	2.5	4	1	2	3	4
Baseline Purchases		3	3	2	0	3	3	2	0	5	2	1	0
After Removal Purchases		3	1	2	2	4	1	3	0	2	4	2	0
Post-Experiment Rank (Favorite to Least)		1	2	3	4	1	2	3	4	1	2	3	4
Explanation of occurrence		Pushed a button for 15 sec to earn tokens then I bought skittles with the tokens				Push button to earn tokens then use tokens to buy skittles				I pushed a button to earn tokens then bought skittles with the tokens			
Feelings		It was fun, at one point you took away the green then put it back				It was fun				I had fun			

Table 7

All Participant's Summarized Results

Participant	Session #	Purchased More Than Baseline After Removal	Purchased Removed First On Return
Participant 1	1	Yes	Yes
Participant 2	1	Yes	Yes
Participant 3	1	No	Yes
Participant 4	1	Yes	Yes
	2	Yes	Yes
Participant 5	1	No	No
	2	Yes	Yes
Participant 6	1	No	No
	2	Yes	Yes
	3	Yes	No

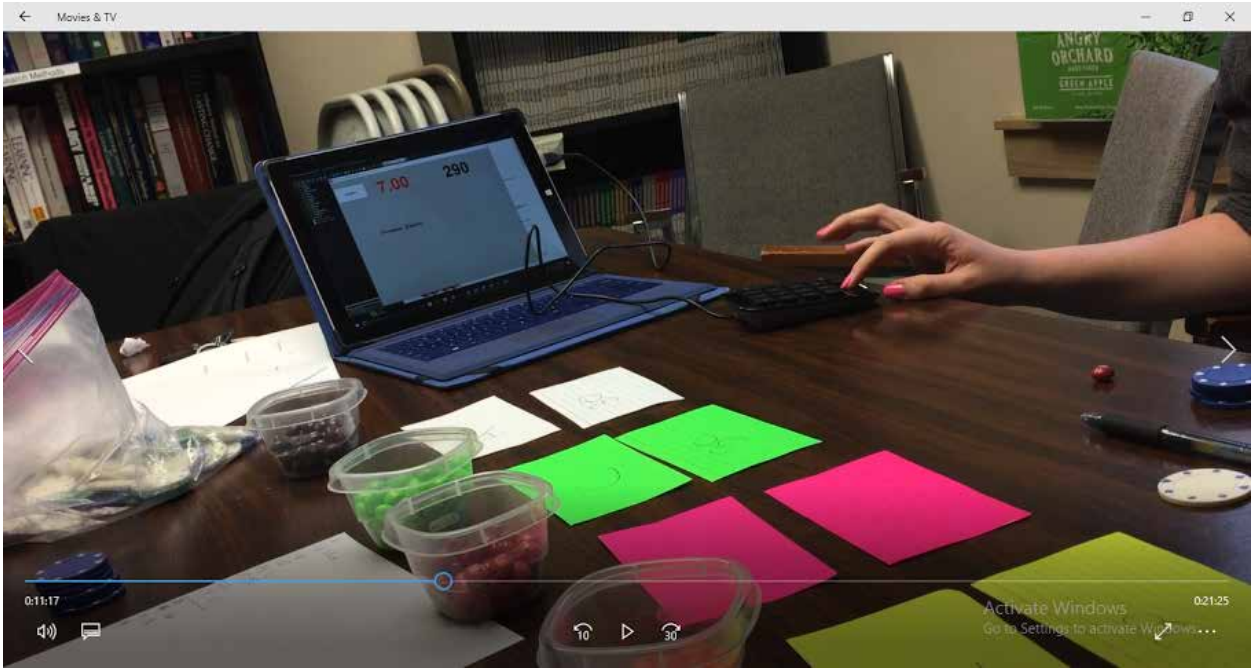

Figure 1. Experimental layout of computer, operandum, containers, and candies.

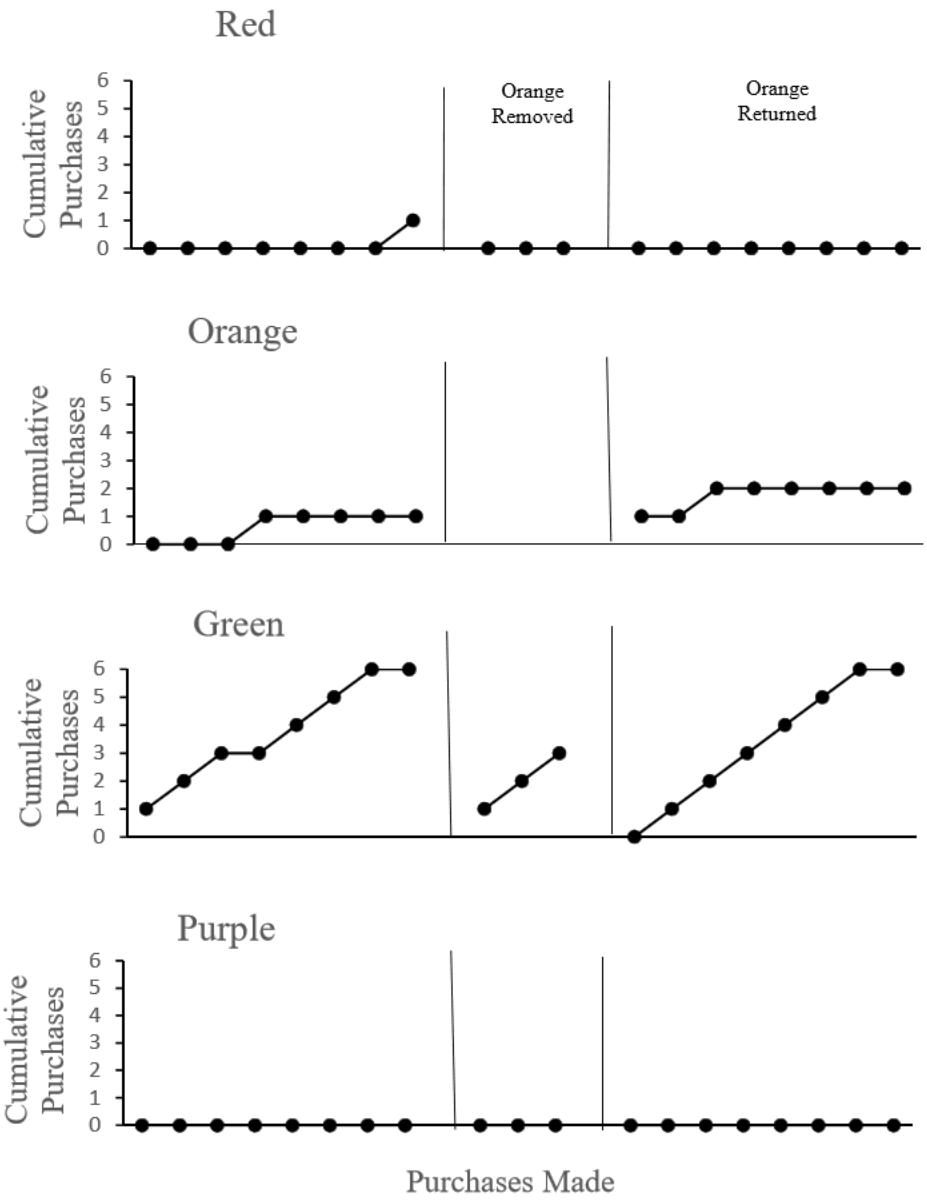

Figure 2. Cumulative record of Participant 1's Purchases.

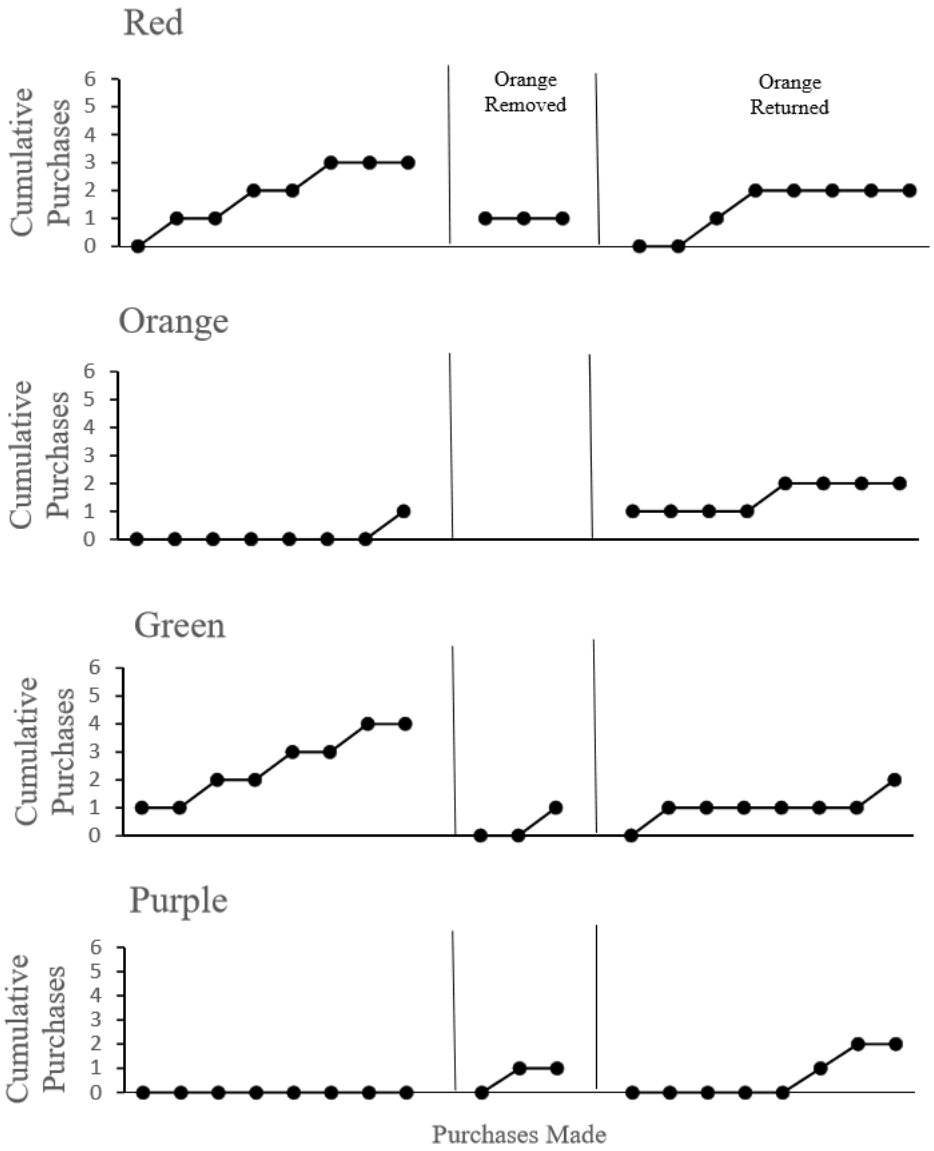

Figure 3. Cumulative record of Participant 2's Purchases. The container of Orange Skittles was removed.

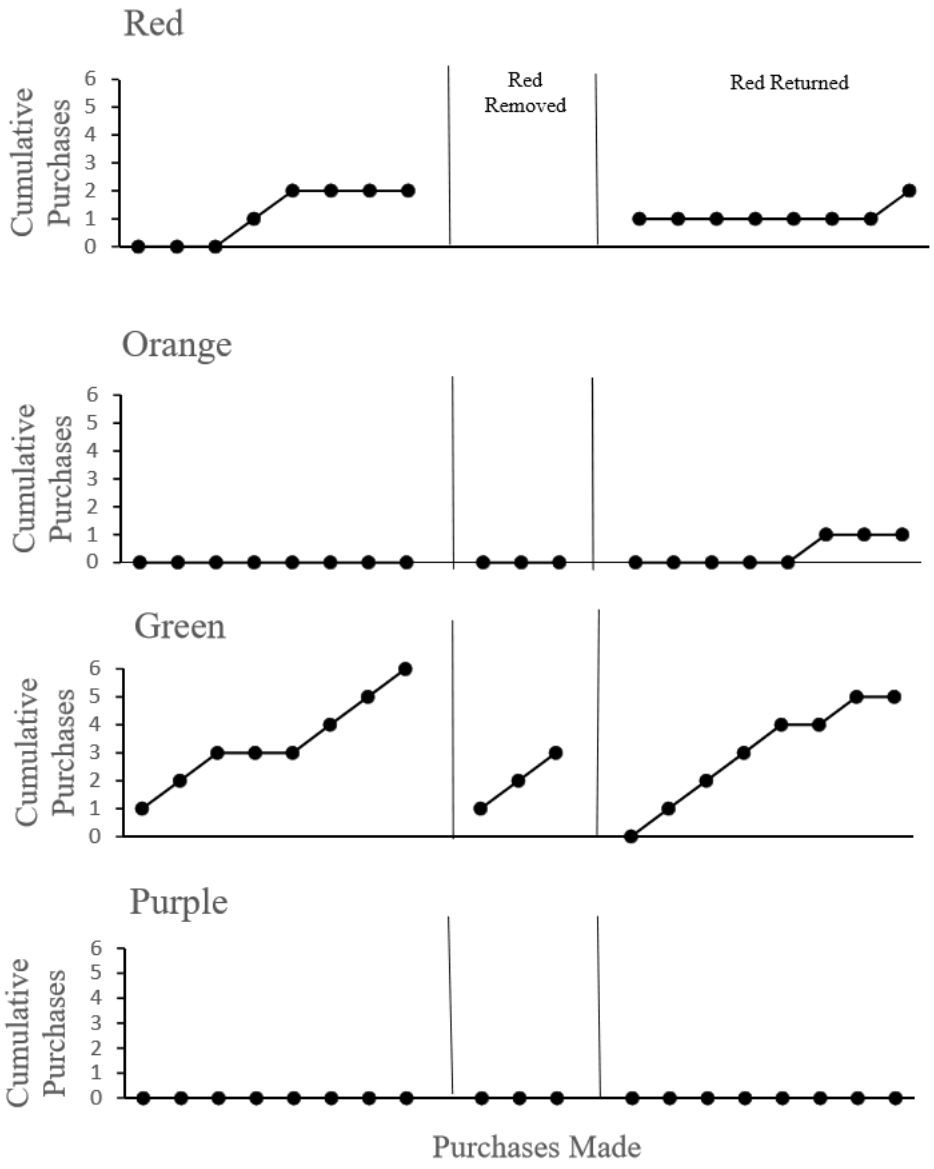

Figure 4. Cumulative record of Participant 3's Purchases. The container of Orange Skittles was removed.

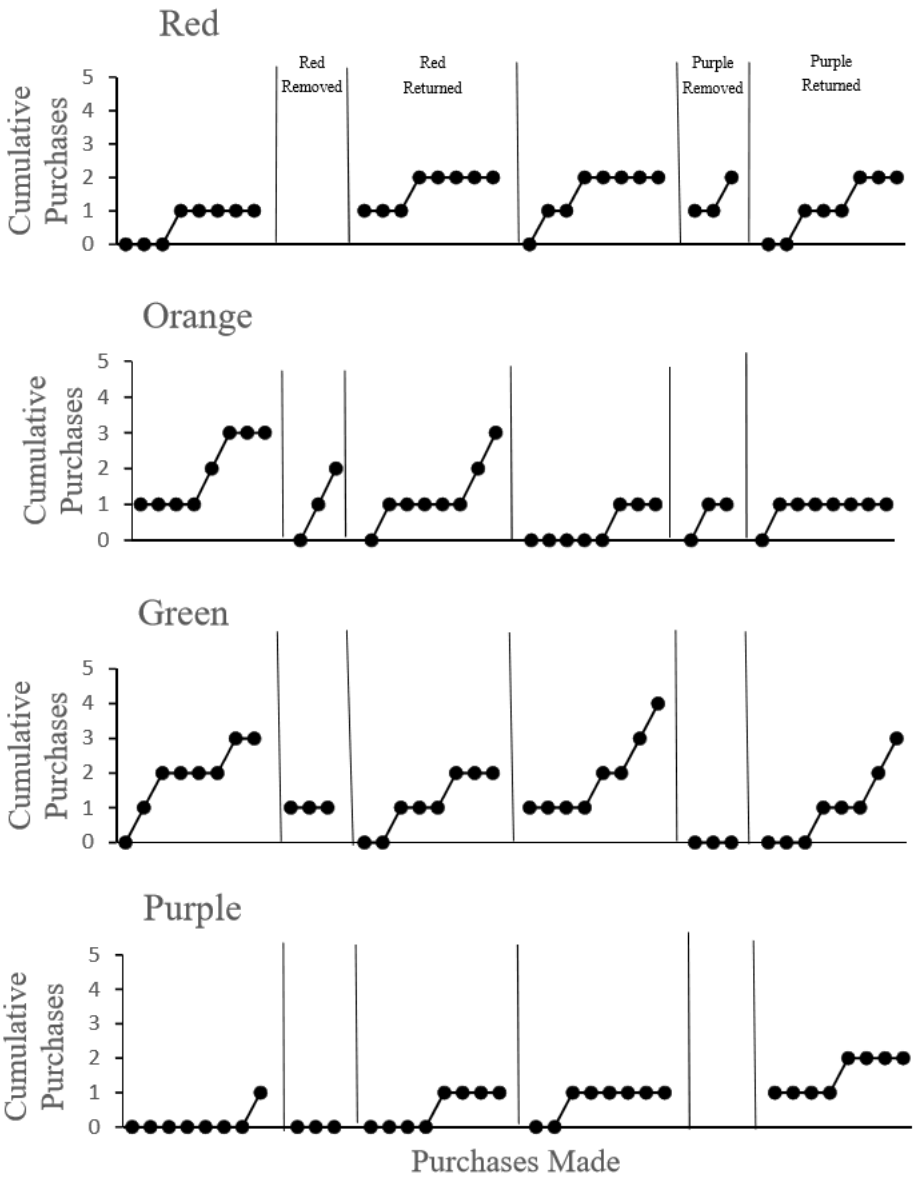

Figure 5. Cumulative record of Participant 4's Purchases. The container of red Skittles was removed followed by the removal of the purple Skittles container in the second session.

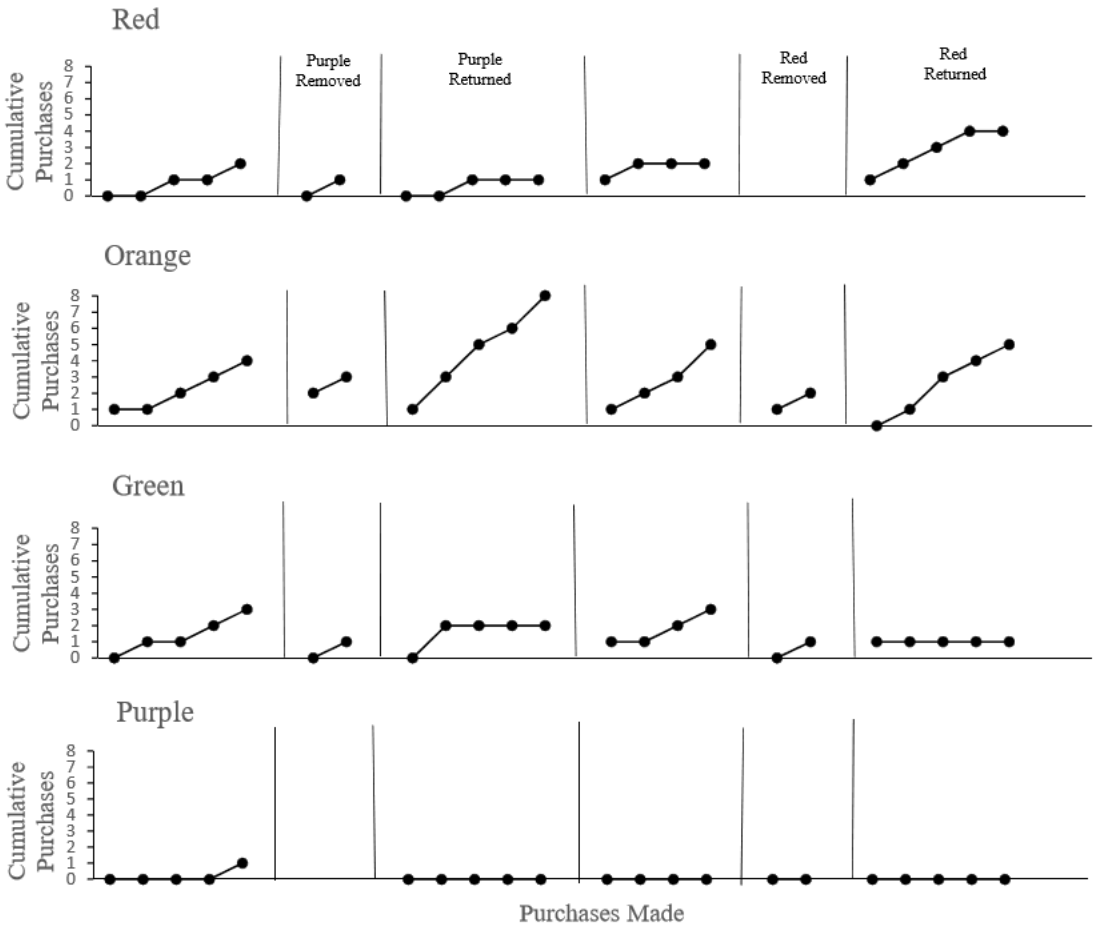

Figure 6. Cumulative record of Participant 5's purchases. The container of purple Skittles was removed followed by the removal of the red Skittles container in the second session

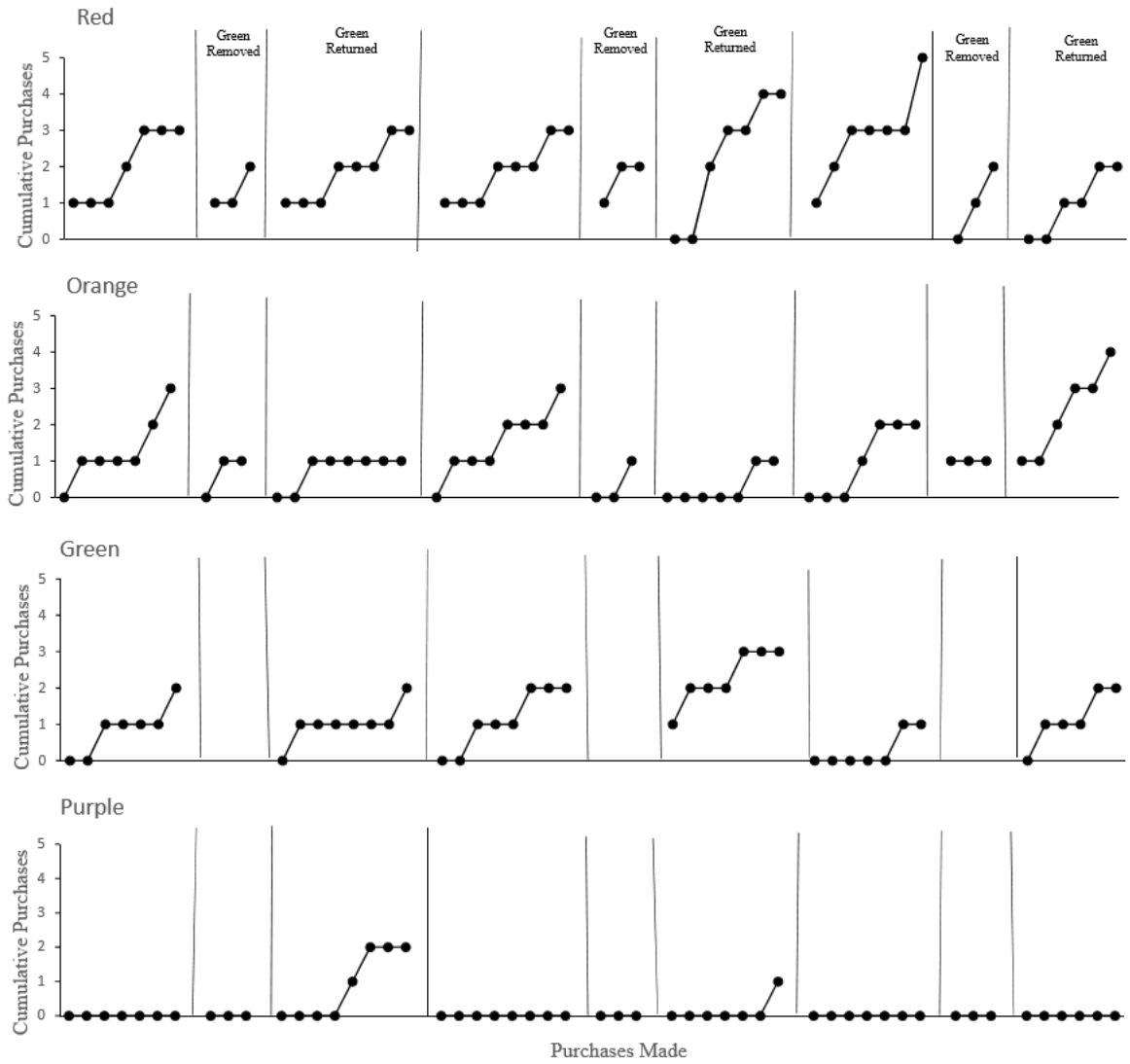

Figure 7. Cumulative record of Participant 6's purchases. The container of green Skittles was removed for all three sessions.

APPENDIX

SURVEY

Candy:_____ Color:_____

Color:

Low Quality High Quality

1 2 3 4 5 6 7

Cut:

Low Quality High Quality

1 2 3 4 5 6 7

Consume the candy then rank

Texture

Low Quality High Quality

1 2 3 4 5 6 7

Taste

Low Quality High Quality

1 2 3 4 5 6 7

Desire to try again

Low Quality High Quality

1 2 3 4 5 6 7

Candy:_____ Color:_____

Order from Favorite To Least Taste (Example, Cherry,

1._____ A. _____

2._____ B. _____

3._____ C. _____

4._____ D. _____

5. _____ E. _____

_____

_____

_____

What made you participate in this study?

_____

_____

_____

_____

_____

Briefly explain what happened and changed during the course of the experiment?

_____

_____

_____

_____

How did this make you feel?

_____

_____

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